Polar Biology

Volume 10 1989/90

Springer International

e life of organisms under the extreme environ-
ntal conditions of polar and subpolar regions is of
erest to a rapidly increasing number of scientists
king in different fields of biological and environ-
ntal research. Polar Biology should not only be the
al point for scientists working in polar regions but
uld also attract the interest of those working in
ogy in general, ecology and physiology, as well as
ceanography and climatology related to polar life.

ar Biology presents results of all kinds of studies
lants, animals, and micro-organisms of the polar
subpolar regions.

- Life history
- Ecology
- Distribution, abundance and biogeography
- Physiology of growth and reproduction
- Biochemistry and metabolism
- Behaviour and sensory physiology
- Genetics
- Embryology and morphology
- Dynamics of populations
- Taxonomy and systematics
- Environmental studies
- Evolution

naging Editor

Hempel
ed-Wegener-Institut
Polar- und Meeresforschung
umbusstrasse
2850 Bremerhaven, FRG

tor

. Siegfried
versity of Cape Town
cy Fitzpatrick Institute
frican Ornithology
ndebosch 7700, South Africa

Advisory Editors

V. Alexander, Fairbanks, USA
T. Antezana, Concepción, Chile
W. Block, Cambridge, UK
N. Bonner, Cambridge, UK
A. Clarke, Cambridge, UK
S.Z. El-Sayed, College Station, USA
I. Hampton, Roggebaai, RSA
G. Höpner-Petersen, Kopenhagen, Denmark
O. Holm-Hansen, San Diego, USA
C.C.E. Hopkins, Tromsö, Norway
G. Hubold, Kiel, FRG
J.C. Hureau, Paris, France
L. Kappen, Kiel, FRG
K.R. Kerry, Kingston, Australia
R.I. Lewis-Smith, Cambridge, UK
J. Meincke, Hamburg, FRG
T. Nemoto, Tokyo, Japan
S. Rakusa-Suszczewski, Dziekanow, Poland
G. Rytter Hasle, Oslo, Norway
J.R. Sargent, Stirling, UK
D.V. Siniff, Minneapolis, USA
J.-O. Strömberg, Fiskebäckskil, Sweden
C.W. Sullivan, Los Angeles, USA
M.M. Tilzer, Konstanz, FRG

Technical Editor

I. Hempel, Bremerhaven, FRG

yright

mission of a manuscript implies: that the
described has not been published before
ept in the form of an abstract or as part of a
shed lecture, review, or thesis); that it is not
er consideration for publication elsewhere;
its publication has been approved by all
thors, if any, as well as by the responsible
orities at the institute where the work has
carried out; that, if and when the manu-
t is accepted for publication, the authors
e to automatic transfer of the copyright to
ublisher; and that the manuscript will not
ublished elsewhere in any language without
consent of the copyright holders.

rticles published in this journal are protec-
y copyright, which covers the exclusive
s to reproduce and distribute the article
, as offprints), as well as all translation rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher.

The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.

While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Special regulations for photocopies in the USA: Photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U.S. Copyright Law, provided a fee is paid. This fee is US $ 0.20 per page, or a minimum of US $ 1.00 if an article contains fewer than five pages. All fees should be paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0722-4060, the volume, and the first and last page numbers of each article copied. The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

ed in Germany – © Springer-Verlag Berlin Heidelberg 1989/90 · Springer-Verlag GmbH & Co. KG, 1000 Berlin 33, FRG
eset by Macmillan India Ltd., Bangalore, India; printed by Heidelberger Reprographie A. Grosch GmbH, W-6904 Eppelheim, FRG

Contents

Adelung D → Wilson RP
Ainley DG → Fraser WR
Aletsee L → Tillmann U
Atkinson A: Distribution of Six Major Copepod Species Around South Georgia During an Austral Winter 81

Barthel K-G: Relationships of Food Uptake and Body Components of *Calanus finmarchicus, C. glacialis* and *C. hyperboreus* to Particulate Matter and Water Characteristics in Fram Strait 343
Battaglia B → Patarnello T
Baumann MEM → Tillmann U
Bedo AW, Head EJH, Conover RJ, Horne EPW, Harris LR: Physiological Adaptations of an Under-Ice Population of *Pseudocalanus* in Barrow Strait (N.W.T.) to Increasing Food Supply in Spring 561
Bergström B → Siegel V
Beyens L, Chardez D, De Baere D, De Bock P, Jacques E: Ecology of Terrestrial Testate Amoebae Assemblages from Coastal Lowlands on Devon Island (NWT, Canadian Arctic) 431
Bhargava PM → Shivaji S
Bisol PM → Patarnello T
Block W → Ring RA
Block W → Sømme L
Blot M, Thiriot-Quiévreux C, Soyer J: Genetic Differences and Environments of Mussel Populations in Kerguelen Islands 167
Bouvy M, Soyer J: Benthic Seasonality in an Intertidal Mud Flat at Kerguelen Islands (Austral Ocean). The Relationships Between Meiofaunal Abundance and Their Potential Microbial Food 19
Boyd IL: Spatial and Temporal Distribution of Antarctic Fur Seals *(Arctocephalus gazella)* on the Breeding Grounds at Bird Island, South Georgia 179
Bradstreet MSW → Finley KJ
Buck KR → Garrison DL
Burton HR → Franzmann PD
Burton HR → Tucker MJ

Cabrera S, Montecino V: Photosynthetic Parameters of the Entire Euphotic Phytoplankton of the Bransfield Strait, Summer 1985 507
Camardella L → Prisco G di
Caruso C → Prisco G di
Chardez D → Beyens L
Clement P → Smith REH
Cockcroft VG → Klages NTW
Coleman ChO: Burrowing, Grooming, and Feeding Behaviour of *Paraceradocus,* an Antarctic Amphipod Genus (Crustacea) 43
Conover RJ → Bedo AW
Cooper J → Ryan PG
Coppellotti O: Description of *Uronema marinum* (Ciliophora, Scuticociliatida) from the Antarctica and Observations on the Nuclear Events in Conjugation 365
Coria NR → Wilson RP
Cripps GC: Hydrocarbons in the Seawater and Pelagic Organisms of the Southern Ocean 393
Culik B → Wilson RP

Dahms H-U: First Record of a Lecithotrophic Nauplius in Harpacticoida (Crustacea, Copepoda) Collected from the Weddell Sea (Antarctica) (Short Note 221
Daponte MC → Esnal GB
Davey MC: The Effects of Freezing and Desiccation on Photosynthesis and Survival of Terrestrial Antarctic Algae and Cyanobacteria 29
D'Avino R → Prisco G di
De Baere D → Beyens L
De Bock P → Beyens L
Delgado M → Estrada M
Deprez PP → Franzmann PD
Dietz R → Hansen CT

Ekau W → Hubold G
Ensor PH, Shaughnessy PD: Fur Seals Over the Kerguelen Plateau and Elsewhere in the Southern Ocean (Short Note) 481
Erikstad KE: Winter Diets of Four Seabird Species in the Barents Sea After a Crash in the Capelin Stock 619
Esnal GB, Daponte MC: Stolon Development and Some Aspects of Musculature in the Characterization of *Ihlea racovitzai* (van Beneden, 1913) and *Ihlea magalhanica* (Apstein, 1894) (Tunicata, Thaliacea) 265
Estrada M, Delgado M: Summer Phytoplankton Distributions in the Weddell Sea 441

Fevolden SE, Haug T, Vader W: Intra- and Interspecific Allozymic Variation in *Liparis fabricii* and *Liparis gibbus* (Teleostei, Liparididae) from Spitsbergen Waters 107
Fiala M, Oriol L: Light-Temperature Interactions on the Growth of Antarctic Diatoms 629
Finley KJ, Bradstreet MSW, Miller GW: Summer Feeding Ecology of Harp Seals *(Phoca groenlandica)* in Relation to Arctic Cod *(Boreogadus saida)* in the Canadian High Arctic 609
Foster BA: Balanomorph Barnacle Larvae in the Plankton at McMurdo Sound, Antarctica 175
Fraile ER → Mac Cormack WP
Franzmann PD, Deprez PP, McGuire AJ, McMeekin TA, Burton HR: The Heterotrophic, Bacterial Microbiota of Burton Lake, Antarctica (Short Note) 261
Fraser WR, Pitman RL, Ainley DG: Seabird and Fur Seal Responses to Vertically Migrating Winter Krill Swarms in Antarctica 37
Fryxell GA: Marine Phytoplankton at the Weddell Sea Ice Edge: Seasonal Changes at the Specific Level 1
Fuser V → Patarnello T

Gales R → Klages N
Galm R → Welsch U
Garrison DL, Buck KR: The Biota of Antarctic Pack Ice in the Weddell Sea and Antarctic Peninsula Regions 211
Gomes V → Van Ngan P
Gräfe M → Reijnders PJH
Grainger EH, Hsiao SIC: Trophic Relationships of the Sea Ice Meiofauna in Frobisher Bay, Arctic Canada 283
Gutkowski R, Maleszewski S: Seasonal Changes of the Photosynthetic Capacity of the Antarctic Macroalga *Adenocystis utricularis* (Bory) Skottsberg 145
Gutt J → Klages N

Hampton I → Miller DGM
Hansen CT, Nielsen CO, Dietz R, Hansen MM: Zinc, Cadmium, Mercury and Selenium in Minke Whales, Belugas and Narwhals from West Greenland 529
Hansen MM → Hansen CT
Harris LR → Bedo AW
Hasle GR → Medlin LK
Haug T → Fevolden SE
Head EJH → Bedo AW
Heine JC, Speir TW: Ornithogenic Soils of the Cape Bird Adelie Penguin Rookeries, Antarctica 89
Hessen DO, Sandøy S, Ottesen P: Calanoid Copepods from South Georgia, with Special Reference to Size Dimorphism Within the Genus *Pseudoboeckella* 71
Hewes CD → Holm-Hansen O

Hill HJ: A New Method for the Measurement of Antarctic Krill *Euphausia superba* Dana from Predator Food Samples 317
Holm-Hansen O, Mitchell BG, Hewes CD, Karl DM: Phytoplankton Blooms in the Vicinity of Palmer Station, Antarctica 49
Hopkins CCE → Lutter S
Horne EPW → Bedo AW
Hsiao SIC → Grainger EH
Hubold G, Ekau W: Feeding Patterns of Post-Larval and Juvenile Notothenioids in the Southern Weddell Sea (Antarctica) 255
Huntley ME, Sykes PF, Marin V: Biometry and Trophodynamics of *Salpa thompsoni* foxton (Tunicata: Thaliacea) Near the Antarctic Peninsula in Austral Summer, 1983–1984 59

Irwin BD: Primary Production of Ice Algae on a Seasonally-Ice-Covered, Continental Shelf 247

Jacques E → Beyens L

Karl DM → Holm-Hansen O
Kerry E: Effects of Temperature on Growth Rates of Fungi from Subantarctic Macquarie Island and Casey, Antarctica 293
Kerry E: Microorganisms Colonizing Plants and Soil Subjected to Different Degrees of Human Activity, Including Petroleum Contamination, in the Vestfold Hills and MacRobertson Land, Antarctica 423
Klages M, Gutt J: Observations on the Feeding Behaviour of the Antarctic Gammarid *Eusirus perdentatus* Chevreux, 1912 (Crustacea: Amphipoda) in Aquaria 359
Klages NTW, Cockcroft VG: Feeding Behaviour of a Captive Crabeater Seal (Short Note) 403
Klages N, Gales R, Pemberton D: The Stomach Contents of Antarctic Petrels *Thalassoica antarctica* Feeding Young Chicks at Scullin Monolith, Mawson Coast, Antarctica 545
Konecki JT, Targett TE: Eggs and Larvae of *Nototheniops larseni* from the Spongocoel of a Hexactinellid Sponge near Hugo Island, Antarctic Peninsula 197

Lutter S, Taasen JP, Hopkins CCE, Smetacek V: Phytoplankton Dynamics and Sedimentation Processes During Spring and Summer in Balsfjord, Northern Norway 113

Mac Cormack WP, Fraile ER: Bacterial Flora of Newly Caught Antarctic Fish *Notothenia neglecta* 413
Maleszewski S → Gutkowski R
Marchant HJ, Perrin RA: Seasonal Variation in Abundance and Species Composition of Choanoflagellates (Acanthoecideae) at Antarctic Coastal Sites 499
Marin V → Huntley ME
Masson M: Contribution to Antarctic Krill Acoustic Studies - Results of the *NO Marion-Dufresne* MD25/ FIBEX Cruise 101
McGuire AJ → Franzmann PD
McMeekin TA → Franzmann PD
Medlin LK, Hasle GR: Some *Nitzschia* and Related Diatom Species from Fast Ice Samples in the Arctic and Antarctic 451
Miller DGM, Hampton I: Krill Aggregation Characteristics: Spatial Distribution Patterns from Hydroacoustic Observations 125
Miller DGM, Hampton I: Synopsis of "The Biology and Ecology of the Antarctic Krill, *Euphausia superba* Dana" (Review) 485
Miller GW → Finley KJ
Mitchell BG → Holm-Hansen O
Montecino V → Cabrera S
Montgomery JC → Pankhurst NW

Nielsen CO → Hansen CT
Norman FI, Ward SJ: Foods of the South Polar Skua at Hop Island, Rauer Group, East Antarctica 489

Oriol L → Fiala M
Ottesen PS: Diel Activity Patterns of Carabidae, Staphylinidae and Perimylopidae (Coleoptera) at South Georgia, Sub-Antarctic 515
Ottesen P → Hessen DO

Pankhurst NW: Growth and Reproduction of the Antarctic Nototheniid Fish *Pagothenia borchgrevinki* 387
Pankhurst NW, Montgomery JC: Ontogeny of Vision in the Antarctic Fish *Pagothenia borchgrevinki* (Nototheniidae) 419
Passos MJACR → Van Ngan P
Patarnello T, Bisol PM, Varotto V, Fuser V, Battaglia B: A Study of Enzyme Polymorphism in the Antarctic Amphipod *Paramoera walkeri* Stebbing 495
Pemberton D → Klages N
Percy JA → Shea JR
Perrin RA → Marchant HJ
Piatkowski U → Siegel V
Pickup J: Seasonal Variation in the Cold-Hardiness of a Free-Living Predatory Antarctic Nematode, *Coomansus gerlachei* (Mononchidae) 307
Pitman RL → Fraser WR
Ploetz J → Welsch U
Plötz J → Reijnders PJH
Post A: Photoprotective Pigment as an Adaptive Strategy in the Antarctic Moss *Ceratodon purpureus* 241
Prisco G di, D'Avino R, Camardella L, Caruso C, Romano M, Rutigliano B: Structure and Function of Hemoglobin in Antarctic Fishes and Evolutionary Implications 269

Radtke RL: Age Determination of the Antarctic Fishes *Champsocephalus gunnari* and *Notothenia rossii marmorata* from South Georgia 321
Razouls C, Razouls S: Biological Cycle of a Population of Subantarctic Copepod, *Drepanopus pectinatus* (Clausocalanidae), Kerguelen Archipelago (Short Note) 541
Razouls S → Razouls C
Reddy GSN → Shivaji S
Reijnders PJH, Plötz J, Zegers J, Gräfe M: Breeding Biology of Weddell Seals *(Leptonychotes weddellii)* at Drescher Inlet, Riiser Larsen Ice Shelf, Antarctica 301
Ring RA, Block W, Sømme L, Worland MR: Body Water Content and Desiccation Resistance in Some Arthropods from Subantarctic South Georgia 581
Ring RA → Sømme L
Romano M → Prisco G di
Rutigliano B → Prisco G di
Ryan PG, Cooper J: The Distribution and Abundance of Aerial Seabirds in Relation to Antarctic Krill in the Prydz Bay Region, Antarctica, During Late Summer 199
Ryan PG, Watkins BP: The Influence of Physical Factors and Ornithogenic Products on Plant and Arthropod Abundance at an Inland Nunatak Group in Antarctica 151

Saisree L → Shivaji S
Sandøy S → Hessen DO
Schalk PH: Biological Activity in the Antarctic Zooplankton Community 405
Schalk PH → Siegel V
Seshu Kumar G → Shivaji S
Shaughnessy PD → Ensor PH
Shea JR, Percy JA: Salinity Tolerance and Osmoregulation of the Arctic Marine Amphipods *Onisimus litoralis* (Kroyer) and *Anonyx nugax* (Phipps) 275

Shivaji S, Shyamala Rao N, Saisree L, Reddy GSN, Seshu Kumar G, Bhargava PM: Isolates of Arthrobacter from the Soils of Schirmacher Oasis, Antarctica 225
Shyamala Rao N → Shivaji S
Siegel V, Piatkowski U: Variability in the Macrozooplankton Community off the Antarctic Peninsula 373
Siegel V, Bergström B, Strömberg JO, Schalk PH: Distribution, Size Frequencies and Maturity Stages of Krill, *Euphausia superba,* in Relation to Sea-Ice in the Northern Weddell Sea 549
Smetacek V → Lutter S
Smith REH, Clement P: Heterotrophic Activity and Bacterial Productivity in Assemblages of Microbes from Sea Ice in the High Arctic 351
Sømme L, Ring RA, Block W, Worland MR: Respiratory Metabolism of *Hydromedion sparsutum* and *Perimylops antarcticus* (Col., Perimylopidae) from South Georgia 135
Sømme L, Ring RA, Block W, Worland MR: Feeding in the Two Phytophagous Beetles *Hydromedion sparsutum* and *Perimylops antarcticus* from South Georgia (Short Note) 141
Sømme L → Ring RA
Soyer J → Blot M
Soyer J → Bouvy M
Spairani HJ → Wilson RP
Speir TW → Heine JC
Strömberg JO → Siegel V
Suren A: Microfauna Associated with Algal Mats in Melt Ponds of the Ross Ice Shelf 329
Suzuki H → Van Ngan P
Sykes PF → Huntley ME

Taasen JP → Lutter S
Targett TE → Konecki JT
Thiriot-Quiévreux C → Blot M
Tillmann U, Baumann MEM, Aletsee L: Distribution of Carbon Among Photosynthetic End Products in the Bloom-Forming Arctic Diatom *Thalassiosira antarctica* COMBER 231
Tucker MJ, Burton HR: Seasonal and Spatial Variations in the Zooplankton Community of an Eastern Antarctic Coastal Location 571

Vader W → Fevolden SE
Van Ngan P, Gomes V, Suzuki H, Passos MJACR: Preliminary Study on Chromosomes of Antarctic Krill, *Euphausia superba* Dana (Short Note) 149
Varotto V → Patarnello T

Wagner H → Welsch U
Ward SJ → Norman FI
Watkins BP → Ryan PG
Wägele J-W: Crowth in Captivity and Aspects of Reproductive Biology of the Antarctic Fish Parasite *Aega antarctica* (Crustacea, Isopoda) 521
Welsch U, Wagner H, Galm R, Ploetz J: Architecture and Functional Aspects of the Distal Airways of Antarctic Seals with Different Habits, the Weddell Seal *(Leptonychotes weddellii)* and the Crabeater Seal *(Lobodon carcinophagus)* 187
Wiencke C: Seasonality of Brown Macroalgae from Antarctica – a Long-Term Culture Study Under Fluctuating Antarctic Daylengths 589
Wiencke C: Seasonality of Red and Green Macroalgae from Antarctica – a Long-Term Culture Study Under Fluctuating Antarctic Daylengths 601
Wilson ME: Morphology and Photosynthetic Physiology of *Grimmia antarctici* from Wet and Dry Habitats 337
Wilson RP, Coria NR, Spairani HJ, Adelung D, Culik B: Human-Induced Behaviour in Adélie Penguins *Pygoscelis adeliae* 77
Wilson RP, Culik B, Coria NR, Adelung D, Spairani HJ: Foraging Rhythms in Adélie Penguins *(Pygoscelis adeliae)* at Hope Bay, Antarctica; Determination and Control 161
Worland MR → Ring RA
Worland MR → Sømme L

Zegers J → Reijnders PJH

Book Review 239

Indexed in *Current Contents*

Advice to authors

Your illustrations will be shown to best advantage if you follow the brief set of instructions below. Please read them carefully. Thank you.

The Publisher

Preparation of line drawings

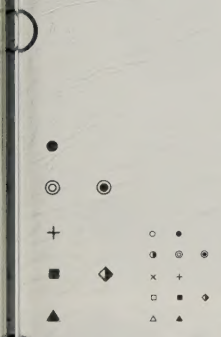
Drawings should be in the desired final size and executed in indelible black ink.

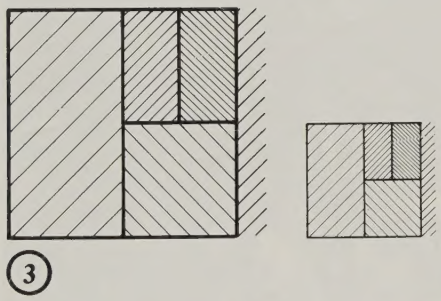
Important points to note are: the thickness of lines, size of inscriptions, size of measuring points, and adequate spacing of shaded and dotted areas.

Words should be in the proper upper- and lowercase letters and not all in CAPITAL letters.

Following are the optimal sizes *after* reduction:
Capital letters and numbers: 2 mm
Lowercase letters: 1.6 mm

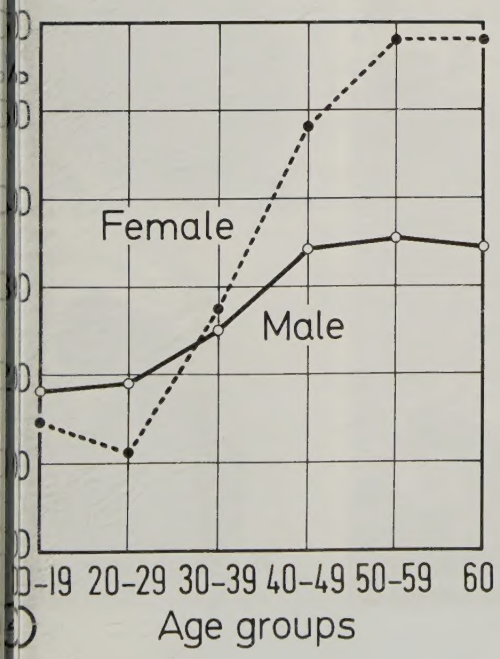
ABCDEFGHIJKLMNOPQRSTUVWXYZ
aabcdefghijklmnopqrstuvwxyz
1234567890 1·5° III IV VIII IX ∞ % ≈
[(=-+x÷ !?:" ",)] (A) (B) (a) (b)

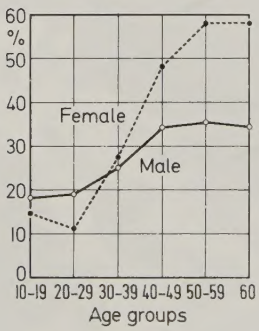


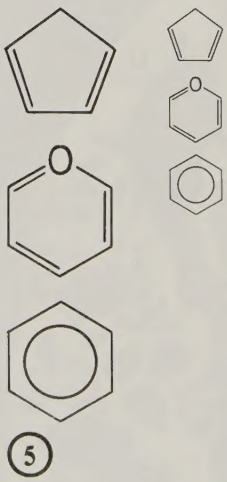


3

samples 1–5 show the original size and reduction × 50%







5

Selection and preparation of illustration material for halftones (photographs, micrographs, X-ray films, instrument traces etc.)

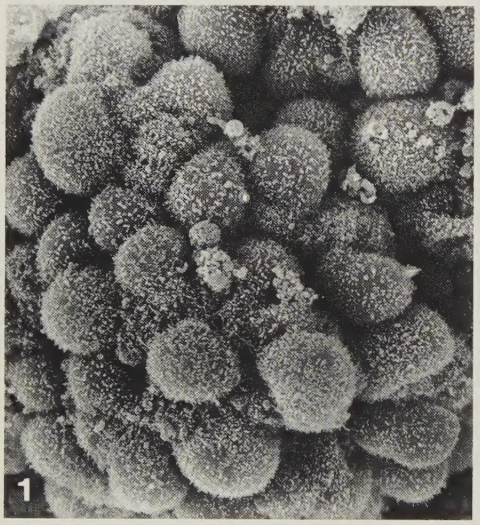
Photographs should be sharp, well-contrasted glossy prints of the original negative, trimmed at right angles. Halftone illustrations should fit the format of the printed page (print area) so that 1:1 reproduction is possible. If reduction is absolutely necessary, please state the desired scale. Mark or crop marginal portions that are not required (at right angles, please).

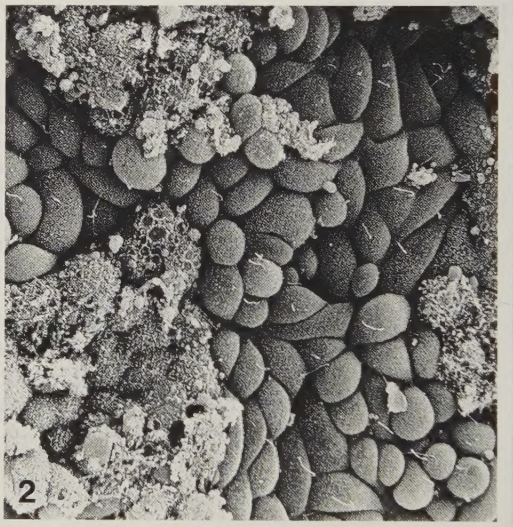
Illustrations that are to appear together should be mounted as plates and, together with the legends, should not exceed the print area. Illustrations must be **mounted on paper-thin flexible material.** Do not use thick cardboard.

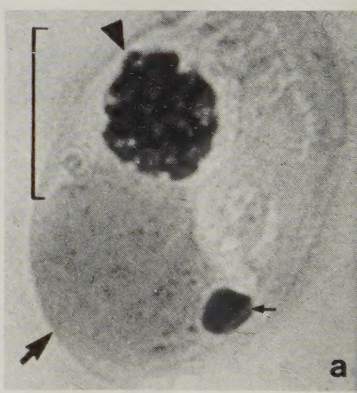
Please indicate the significant parts of X-rays on a copy or overlay.

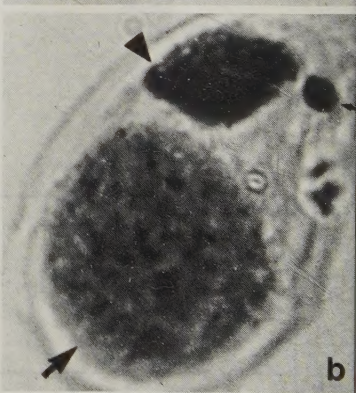
For lettering, marks and scales, use rub-on labelling like Letraset, Mecanorma, or Artist-Aid. **Inscriptions** should be a **maximum of 3 mm** high. Please protect them with an overlay.

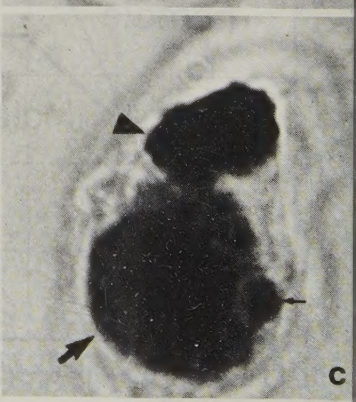
Unless they interfere with important information in the illustration, numbers or lowercase letters that denote the sequence of illustrations in plates should be inserted in the lower left-hand corner of the illustrations. In illustrations that provide poor contrast for labelling, i.e. diffuse or mottled backgrounds, white letters or numbers are preferable. If necessary, use a white round background with black lettering (Mecanorma or Artist-Aid).

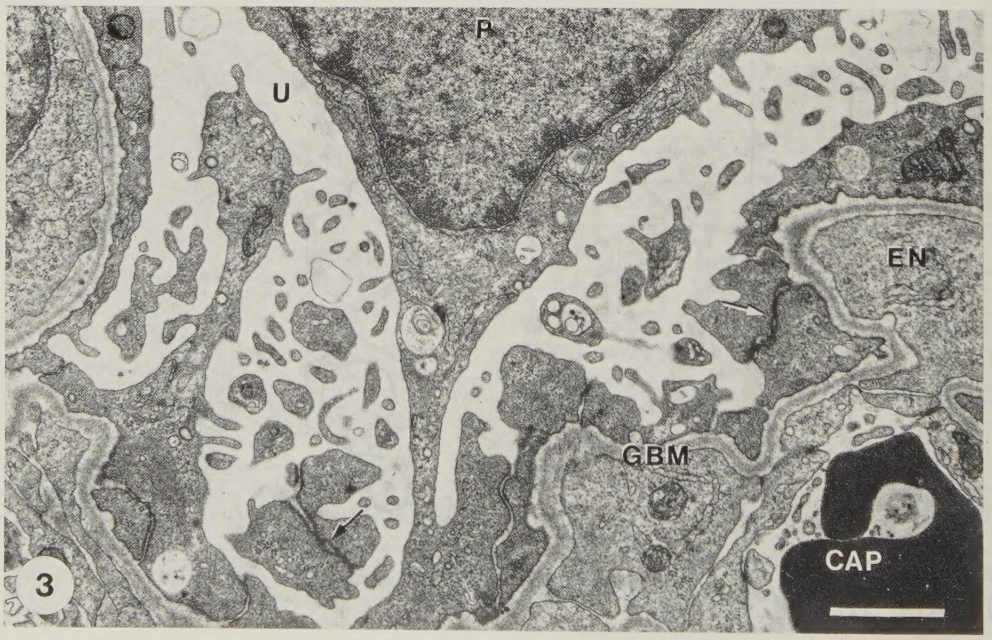












Illustrations reprinted with permission